Pseudo Codes

**Algorithm 1:** Anime Face Generation

Given the SFN model $M_F$, the anime face generative model $M_G$, and a quality threshold $t$.

**Input:** the gender attribute $g$ (male or female)

1. Initialize the iteration step $I=0$;
2. Generate a face image $X_s$ using the model $M_G$ on the condition $g$;
3. Estimate the quality $q$ of $X_s$ with the model $M_F$;
4. Update $I=I+1$;
**Until:** $q>t$ or $I>10$

**Output:** the generated image $X_q$

**Algorithm 2:** Learning Process

Given three DNN backbones $M_F$, $M_D$, and $M_S$, and anime face images $X=\{X_{real}\}$ with incomplete labels $y=(y^g, y^s, y^q)$ respectively corresponding to gender, style, and quality.

**Step 1: Active Label Completion**

1.1 Train three classifiers on each backbone with incomplete labels using Eq. (1);
1.2 Predict the missing labels of $y^g$ and $y^s$ by ensembling three classifiers;
1.3 Fill the original label set $y$ with the prediction and form a complete label set $y'$ except for unknown $y^q$;

**Step 2: Anime GAN**

2.1 Train an SFN model $M_F$ with $y'$ using Eq. (1);
2.2 Extract the last fully connected layer as style features $s$;
2.3 Train GAN models with $\{X_{real}, s, g\}$ using Eq. (2);
2.4 Generate fake images $X_{fake}$ using the generative model $M_G$;

**Step 3: SFN Finetuning**

3.1 Set the quality $y^q=1$ of images $X_{real}$;
3.2 Manually annotate images $X_{fake}$ with different quality $y^q=\{0, 0.5, 1\}$;
3.3 Finetune $M_F$ with both $X_{fake}$ and $X_{real}$ of the quality label $y^q$ using Eq. (1).

**Output:** the SFN model $M_F$ and the anime face generative model $M_G$